

운동부하 검사상 무증상 관동맥질환 환자와 흉통유발 관동맥질환 환자의 비교

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Comparison of Silent Patients with Painful Patients in Patients with Coronary Artery Stenoses during Exercise Myocardial Perfusion Scintigraphy

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ABSTRACT

Background and Objectives : The angiographic profiles and myocardial ischemic variables were compared between patients with and without chest pain during exercise myocardial perfusion scintigraphy in patients with coronary artery stenoses. **Materials and Methods :** Study population were 102 consecutive patients who have significant luminal stenoses (>50%) on coronary angiography. They underwent symptom-limited treadmill exercise test and myocardial perfusion single photon emission computed tomography (SPECT). Tc-99m methoxyisobutyl isonitrile (MIBI) was injected intravenously at rest and one minute before the termination of exercise. Tomographic images were acquired within 1 hour of tracer injection. Electrocardiographic variables, scintigraphic summed reversibility scores and angiographic profiles were compared between patients with and without chest pain during exercise. **Results :** Silent ischemia was noted in 52/102 (51%) of the subjects. The summed reversibility score of myocardial SPECT was not significantly different between patients with (6.0 ± 4.2) and without (5.1 ± 5.0) chest pain. The extent, vessel distribution and stenosis severity of coronary artery disease were not significantly different between two groups. ST segment depression was more prominent in patients with chest pain (1.51 ± 1.49 mm) than without chest pain (0.5 ± 1.1 mm) during exercise stress testing. **Conclusion :** The degree of coronary stenoses and scintigraphic myocardial ischemia was not different between patients with and without chest pain during exercise stress testing. (Korean Circulation J 2000;30(1):49-55)

KEY WORDS : Chest pain · Silent myocardial ischemia · Coronary artery stenoses · Exercise stress testing · Single-photon emission-computed tomography.

서 론

가 가 (modified Bruce's protocol) 1 3 12 - 가 가¹⁾ (silent ischemia) Kemp Ellestad²⁾ 30 2 mm ST 가 가³⁾ J 0.08 1 mm ST 2 mm ST 1 mm ST 1)4)5) Tc - 99m MIBI Tc - 99m methoxy - isobutyl isonitrile(MIBI) 가 가 1 Tc - 99m MIBI 1 296 MBq(8 mCi) 1,110 MBq(30 mCi), 2 740 MBq(20 mCi) 30 1 (Prism 3000XP, Picker, USA) 360 64 x 64 20 3 20% 140 keV (Odyssey, Picker, USA)

재료 및 방법

재 료 1997 1 1998 6 37 (50%) 102 () () 가 85 (83%), 가 17 (17%) 57±9 (35 78) (summed reversibility score) 18 (4, 6, 6, 2) 4 (0 ; , 1 ; , 2 ; , 3 ;) 8

가

가

SPECT 3 (10, 0 81, 80%가 30)
Judkin
50%
SPSS(for Windows, Release 8.0)

Chi-square test, linear by linear association
Student's t-test
p 0.05

결 과

환자군의 임상적 특성

102 50 (49%)
, 52
. 22 (22%), 63 (62%)
, 25 (25%)
, 60 (59%)
. Table 1

(p<0.001).

Table 1. Comparison of clinical characteristics between silent and angina group

	Silent group (n = 52)	Angina group (n = 50)	p-value
Age (yr)	55 ± 9	59 ± 8	0.05
Male	44 (85%)	41 (82%)	NS
DM	12 (23%)	10 (20%)	NS
MI	46 (88%)	17 (34%)	0.001
HTN	10 (19%)	14 (28%)	NS
Med	36 (69%)	24 (48%)	0.05

DM ; diabetes mellitus, MI ; myocardial infarction,
HTN ; hypertension, Med ; medication history,
NS ; not significant

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Table 2

가, ST
가
가
47 (46%) ST
13 (25%),
34 (68%)
(p<0.001).

Table 2. Comparison of hemodynamic response and ECG changes between silent and angina group

	Silent group	Angina group	p-value
SBP (mmHg)	165 ± 29	172 ± 23	NS
DBP (mmHg)	84 ± 17	89 ± 15	NS
Duration (min)	15 ± 3	12 ± 4	0.001
Mets	10 ± 3	7 ± 3	0.001
PHR (/bpm)	139 ± 26	129 ± 25	0.05
DP	23211 ± 6969	2226 ± 5490	NS
%MPHR	85 ± 14	81 ± 15	NS
ST depression (mm)	0.5 ± 1.1	1.5 ± 1.5	0.001

SBP/DBP ; systolic/diastolic blood pressure,
PHR ; peak heart rate, DP ; double product = SBP × PHR,
%MPHR ; %maximal predicted heart rate

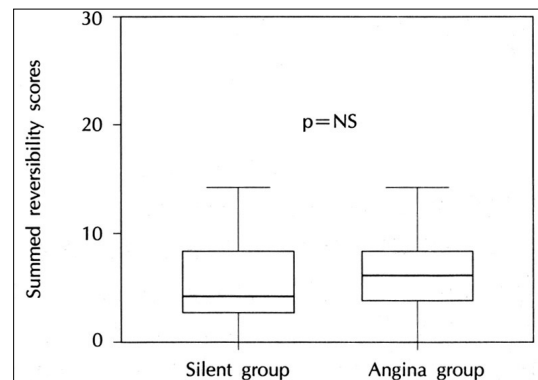


Fig. 1. Comparison of summed reversibility scores between silent and angina group in exercise Tc-99m MIBI SPECT.

(, n=50) (, n=52) . Tc-99m MIBI 18 가 50% .

결 과 :

1) 51%(52/102) .

2) SPECT 가 6.0 ± 4.2, 5.1 ± 5.0 가

3) 21, 13, 16 31, 12, 9 가 (%) 79, 77, 81% , 77, 82, 76% 가 (n) 42, 30, 23 , 39, 20, 22 가

4) ST 1.5 ± 1.5 mm, 0.5 ± 1.1 mm

결 론 :

가 가 .

중심 단어 :

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REFERENCES

- 1) Fearon WF, Voodi L, Atwood JE, Froelicher V. *Should only the squeaky wheel get the grease? The prognostic significance of silent ischemia detected by exercise treadmill testing.* Am Heart J 1998;136:759-61.
- 2) Kemp GL, Ellestad MH. *The incidence of "silent" cor-*

- onary heart disease. Calif Med 1968;109:363-7.
- 3) Rozanski A, Berman D. *Silent myocardial ischemia. I. Pathophysiology, frequency of occurrence, and approaches toward detection.* Am Heart J 1987;114:615-26.
- 4) Beller GA. *Clinical nuclear cardiology. 1st ed.* Philadelphia W.B. Saunders Company;1995. p.169-91.
- 5) Klein J, Chao SY, Berman DS, Rozanski A. *Is 'silent' myocardial ischemia really as severe as symptomatic ischemia? The analytical effect of patient selection biases.* Circulation 1994;89:1958-66.
- 6) Cohn PF. *Prognosis for patients with different types of silent coronary artery disease.* Circulation 1987;75:II33-35.
- 7) Glazier JJ, Chierchia, Brown MJ, Maseri A. *Importance of generalized defective perception of painful stimuli as a cause of silent myocardial ischemia in chronic stable angina pectoris.* Am J Cardiol 1986;58:667-72.
- 8) Droste C, Roskamm H. *Experimental pain measurement in patients with asymptomatic myocardial ischemia.* J Am Coll Cardiol 1983;1:940-5.
- 9) Sheps DS, Adams KF, Hinderliter A, Price C, Bisette J, Orlando G, et al. *Endorphins are related to pain perception in coronary artery disease.* Am J Cardiol 1987;59:523-7.
- 10) Bertolet B, Pepine C. *Silent myocardial ischemia.* Baylor Cardiol Ser 1989;12:5-31.
- 11) Freedland KE, Carney RM, Krone RJ, Smith LJ, Rich MW, Eisenkramer G, et al. *Psychological factors in silent myocardial ischemia.* Psychosom Med 1991;53:13-24.
- 12) Davies RF, Linden W, Habibi H, Klink WP, Nadeau C, Phaneuf DC, Lepage S, et al. *Relative importance of psychologic traits and severity of ischemia in causing angina during treadmill exercise.* J Am Coll Cardiol 1993;21:331-6.
- 13) Bates MS, Edwards WT, Anderson KO. *Ethnocultural influences on variation in chronic pain perception.* Pain 1993;21:331-6.
- 14) Bonow RO, Bacharach SL, Green MV, LaFreniere RL, Epstein SE. *Prognostic implications of symptomatic versus asymptomatic (silent) myocardial ischemia induced by exercise in mildly symptomatic and in asymptomatic patients with angiographically documented coronary artery disease.* Am J Cardiol 1987;60:778-83.
- 15) Iskandrian AS, Hakki A. *Left ventricular function in patients with coronary heart disease in the presence or absence of angina pectoris during exercise radionuclide ventriculography.* Am J Cardiol 1984;53:1239-43.
- 16) Stern S, Weisz G, Gavish A, Keren A, Tzivoni D. *Comparison between silent and symptomatic ischemia during exercise testing in patients with coronary artery disease.* J Cardiopulmonary Rehabil 1988;12:507-12.
- 17) Gasperatti CM, Burwell LR, Beller GA. *Prevalence of and variables associated with silent myocardial ischemia on exercise thallium-201 stress testing.* J Am Coll Cardiol. 1990;16:115-23.
- 18) Hecht HS, Shaw RE, Bruce T, Myler RK. *Silent ischemia: Evaluation by exercise and redistribution tomographic thallium-201 myocardial imaging.* J Am Coll Cardiol 1989; 14:895-900.
- 19) Hirzel HO, Leutwyler R, Krayenbuehl HP. *Silent myocardial ischemia: Hemodynamic changes during dynamic exercise in patients with proven coronary artery disease*

- despite absence of angina pectoris. *J Am Coll Cardiol* 1985; 6:275-84.
- 20) Casella G, Pavesi PC, Medda M, diNiro M, Campese MG, Bracchetti D. Long-term prognosis of painless exercise-induced ischemia in stable patients with previous myocardial infarction. *Am Heart J* 1998;136:894-904.
 - 21) Mahmarian JJ, Pratt CM, Cocanougher MK, Verani MS. Altered myocardial perfusion in patients with angina pectoris or silent ischemia during exercise as assessed by quantitative thallium-201 single-photon emission computed tomography. *Circulation* 1990;82:1305-15.
 - 22) Mark DB, Hlatky MA, Califf RM, Morris JJ, Sisson SD, McCants C, et al. Painless exercise ST deviation on the treadmill: Long-term prognosis. *J Am Coll Cardiol* 1989;14: 885-92.
 - 23) Falcone C, Servi S, Poma E, Campana C, Scire A, Montemartini C, et al. Clinical significance of exercise-induced silent myocardial ischemia in patients with coronary artery disease. *J Am Coll Cardiol* 1987;9:295-9.
 - 24) Garcia EV, Cooke CD, Van Train KF, Folks R, Peifer J, DePuey EG, et al. Technical aspects of myocardial SPECT imaging with technetium-99m sestamibi. *Am J Cardiol* 1990;66:23E-31E.
 - 25) Heller LI, Tresgallo M, Sciacca RR, Blood DK, Seldin DW, Johnson LL, et al. Prognostic significance of silent myocardial ischemia on a thallium stress test. *Am J Cardiol* 1990;65:718-21.
 - 26) Travin MI, Flores AR, Boucher CA, Newell JB, LaRaia PJ. Silent versus symptomatic ischemia during a thallium-201 exercise test. *Am J Cardiol* 1991;68:1600-8.
 - 27) Breitenbucher A, Pfisterer M, Hoffmann A, Burckhardt D. Long-term follow-up of patients with silent ischemia during exercise radionuclide angiography. *J Am Coll Cardiol* 1990;15:999-1003.
 - 28) Cole JP, Ellestad MH. Significance of chest pain during treadmill exercise: Correlation with coronary events. *Am J Cardiol* 1978;41:227-32.
 - 29) Mark DB, Hlatky MA, Califf RM, Morris JJ Jr, Sisson SD, McCants CB, et al. Painless exercise ST deviation on the treadmill: Long-term prognosis. *J Am Coll Cardiol* 1989;14:855-92.
 - 30) Assey ME, Walters GL, Hendrix GH, Carabello BA, Usher BW, Spann JF, et al. Incidence of acute myocardial infarction in patients with exercise induced silent myocardial ischemia. *Am J Cardiol* 1987;59:497-500.
 - 31) Weiner DA, Ryan TJ, McCabe CH, Chaitman BR, Sheffield LT, Fisher LD, et al. Significance of silent myocardial ischemia during exercise testing in patients with coronary artery disease. *Am J Cardiol* 1987;59:725-9.
 - 32) Narins CR, Zareba W, Moss AJ, Goldstein RE, Hall WJ. Clinical implications of silent versus symptomatic exercise-induced myocardial ischemia in patients with stable coronary disease. *J Am Coll Cardiol* 1997;29:756-63.